Un-manned Satellites on Postage Stamps : 1

By Guest contributors Don Hillger and Garry Toth

The TIROS series

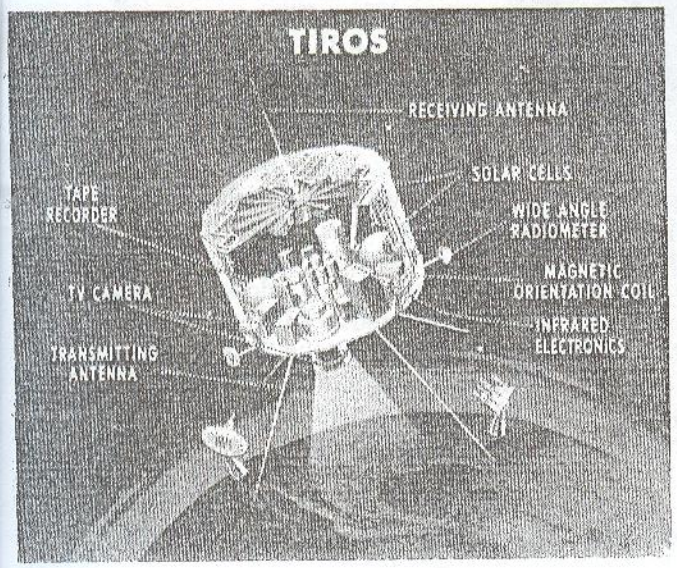
This is the first in a series of articles about un-manned satellites on postage stamps. We hope to feature many different satellites in these articles, but will not include any manned space missions.

We specialize in scientific, weather, and environmental satellites intended for earth orbit, and only minimally consider inter-planetary satellites when they are part of a satellite series that includes earth missions, such as some of the Explorer and Pioneer satellites that will be covered in future articles. Although we collect launch covers, cancels, and meters for the satellites that will be featured, these articles will focus on stamps, souvenir sheets, and postal stationery only.

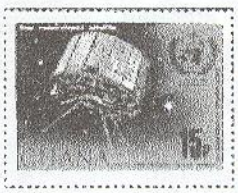
A checklist of postal items that show the featured satellite will accompany each article. Since we do not necessarily have all of the postal items connected with each satellite, we expect that some of the details may be incomplete or incorrect. Some of the questionable material and errors that we have found will be noted. Through this series of articles we wish to share with others the information we have gathered, and at the same time gain information about these satellites from others who have also studied them. We would like our checklists to be as complete as possible.

The First Weather Satellite

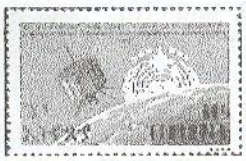
To start this series of articles, we chose the very first weather satellite, the Television and InfraRed Observation Satellite (TIROS). Before TIROS the only images of the earth's cloud cover were those taken from vertical sounding rockets at much lower altitude. The



first TIROS was launched 1 April 1960 and produced crude visible and infrared wavelength pictures of the earth from a polar-orbit altitude of 700 km (see http://antwrp.gsfc.nasa.gov/apod/ap000401.html for an example). Clearly, satellite imagery has improved tremendously over the years from such humble beginnings. A total of ten experimental TIROS were launched over a period of five years, all successfully.



This was followed by a series of nine Environmental Science Service Administration (ESSA) operational satellites, the first of which was launched 3 February 1966. These satellites were named after the U.S. agency then procurement and operation of these satellites, and responsible for integrating satellite imagery into weather analysis and forecasting. Ever since, the entire earth has been photographed daily on a continuous basis.



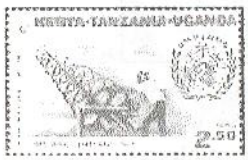
Because these two satellite series, TIROS and ESSA, one experimental and the other operational, are basically similar, they will both be covered in this article. It must be mentioned that the name TIROS continued as part of several generations of follow-on satellites, such as the Improved TIROS series and the Advanced TIROS series. Those satellites will not be discussed here, but will be covered in future articles.

Above Bahamas (1973), Ghana (1973) and Ethiopia (1973)

Far left section through a TIROS satellite and below a technical description of the craft (both from Observer's *Spaceflight Directory* by Reg Turnill, Warne 1978)
Left Mauritania (1963) showing same aspect of a Type A TIROS

Spacecraft Description Tiros satellites had a 'barbox' shape: 18-sided polygons, 1·07 m dia. and 0·55 m high. Solar cells covered the sides and top, with apertures for 2 TV cameras on opposite sides; each camera could take 16 pictures per orbit at 128-sec intervals, though the intervals could be decreased to 32 sec. 2 tape recorders could store up to 48 pictures when ground stations were out of range. The weight of 119 kg for Tiros 1 had risen to 138 kg for Tiros 9 and 10. Essa satellites, similar but more advanced, had 2 APT (Automatic Picture Transmission) cameras, able to photograph a 3000km wide area, with 3km resolution at picture centre. Pictures were taken and transmitted every 352 sec, allowing a typical APT station to receive 8–10 per day. ITOS/NOAA satellites remained box-shaped 1 m × 1 m × 1·24 m, with 3 solar panels, with momentum flywheel providing spacecraft stabilization, and 340 kg wt

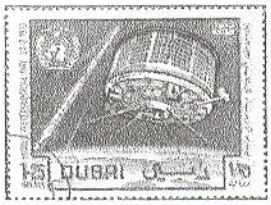
Featured stamps



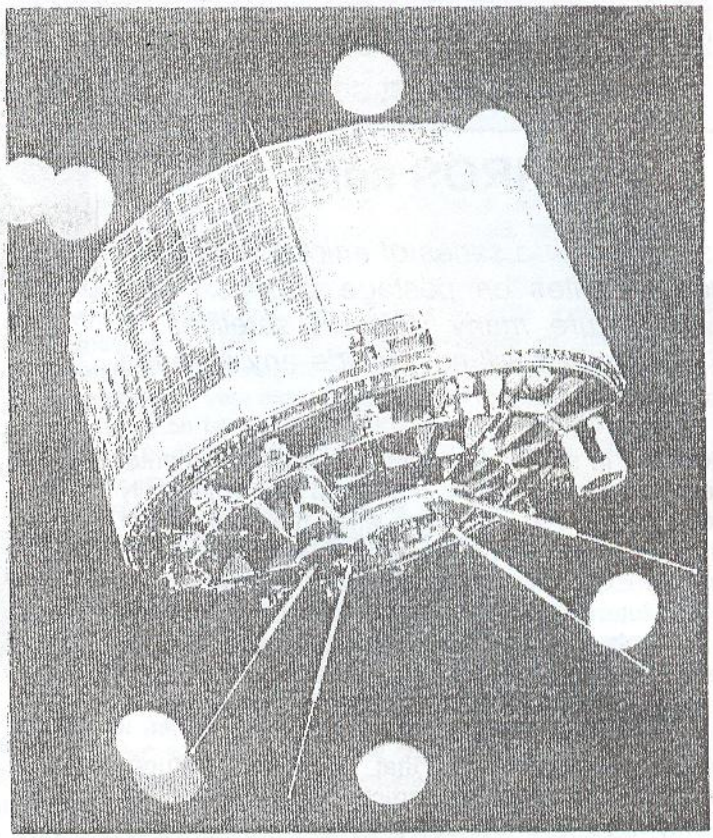
As with most satellites, the TIROS have features that can be used to identify and distinguish them from other satellites. All of the TIROS series have cylindrical bodies covered mostly with solar cells. The body is somewhat flattened, shorter than it is wide, less than 0.5 m tall by just over 1 m in diameter, distinguishing it from many of the early Syncom communications satellites that were taller and smaller in diameter. Another distinction is the lack of a rocket nozzle on the bottom of TIROS compared to Syncom. In addition, the vertical sides of TIROS form a many-sided polygon, unlike the rounded shape of Syncom. On the top of TIROS is a single vertical rod antenna, and on the bottom are four similar antennae equally spaced and at 45 degrees from the vertical axis. Syncom has similar antennae, so they cannot be used to distinguish between the two.

Some of the better images of TIROS on stamps show the camera used to image the earth. On early TIROS the camera was on the bottom of the satellite. (When this camera can be seen these TIROS are designated as Type-A in the table.) For later TIROS models (TIROS-9 and 10), and for all nine of the ESSA series, the camera pointed out of the cylinder wall. (These are designated as TIROS/ESSA in the table.) The change in camera position corresponded with a change in the orientation of the satellite as it orbited the earth. The later satellites rolled as they orbited, making more views of the earth possible than with the prior configuration. (On the remaining TIROS images the camera cannot be seen in either location, leaving these items unclassified except for other indications given on the postal items.)

Space permits only a few of the postal items in the TIROS series to be shown. We will mention a few selected stamps with good TIROS images, not those with smaller or hard-to-discern images of the satellite, or large souvenir sheets that would take up a lot of space. However, images of all of the TIROS items that we have are available on our Website that is introduced below.



Mauritania issued the first stamp showing TIROS in 1963. Similar large and detailed images of TIROS are available on stamps from the Bahamas, Dominica, Dubai, Ghana, Grenada, Indonesia, Maldives, Paraguay,



Tiros 6 gave warning of Autumn storms in Atlantic and Pacific

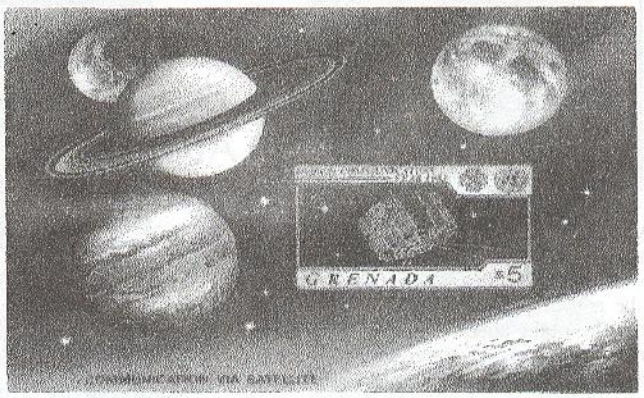
Qatar, and Upper Volta. Other images on stamps are either smaller or much less detailed. The U.S. Post Office has never issued a stamp showing TIROS, even though the U.S. pioneered the weather satellite. The only U.S.-related item showing TIROS is from a commemorative sheet issued at INTERPEX in 1962.

A new Website

In the attempt to identify and distinguish among various un-manned satellites, we have developed a Website dedicated to the display of images of satellites on both launch covers and postage stamps. The URL is http://www.cira.colostate.edu/RAMM/hillger/satellites.htm. Through this Website we hope to verify identity and note errors in satellites on stamps. Since this is a work in progress, any corrections or additions from readers will be greatly appreciated. For images of the postal items that show TIROS follow the links to polar-orbiting weather satellites, and then to the TIROS/ESSA series, or go directly to the URL http://www.cira.colostate.edu/RAMM/hillger/TIROS.htm

One of the best resource/reference books we have found for un-manned satellite images was written by

Giovanni Caprara, titled *The Complete Encyclopedia of Space Satellites* (Portland House, New York NY 10003; ISBN 0-517-61776-5, 1986). In addition, there are many resources on the Web showing information about unmanned satellites. Our Website contains links to many of those Web resources. E-mail correspondence with the authors is welcome. Don Hillger can be reached at hillger@cira.colostate.edu and Garry Toth at garry.toth@ec.gc.ca.



The text of this article with a variety of different illustrations first appeared in *The Astrophile* for March/April 2002 and we are grateful to Editor Bill York for permission to reprint and of course to the two authors for their cooperation in preparing this item. Additional thanks to Reg Turnill for use of his materials

Hillger-Toth Checklist of Postal Items Showing TIROS

Country	Catalog N0.*	Type of Item**	Year	Notes***
Bahamas	346		1973	TIROS (typeA)
Burma	276		1980	TIROS
Chad	707d	Part of S/S of 6	1997	TIROS-6 (typeA)
Czechoslovakia	1295		1965	TIROS
Dominica	354		1973	TIROS launch
Dominica	2238	Part of S/S of 6	2000	TIROS[1]
Dominican Rep.	673		1970	TIROS/ESSA
Dominican Rep.	C178		1970	TIROS/ESSA
Dubai	123		1970	TIROS (typeA)
Ethiopia	663		1973	TIROS (typeA)
Fujeira	Mi77		1966	TIROS
Fujeira	Mi156	Overprint new currency	1967	TIROS
Fujeira	Mi348	Overprint "Apollo 8"	1969	TIROS
Fujeira	BL4	Perf.+ imp. S/S of 2	1966	TIROS
Fujeira	BL8	Perf.+ imp. S/S of 2, overprint new currency	1967	TIROS
Fujeira	BL11A	Perf.+ imp. S/S of 2, overprint "Apollo-8"	1969	TIROS
Ghana	166a	Imp. S/S of 4	1964	TIROS
Ghana	504		1973	TIROS (typeA)
Ghana	507a	Part of S/S of 2	1973	TIROS (typeA)
Grenada	1158	S/S of 1	1983	TIROS/ESSA
Grenada	1250	S/S 1, overprint on 1158	1984	TIROS/ESSA
India	508		1970	TIROS (typeA)
Indonesia	819		1972	ESSA-8
Israel	952		1986	TIROS[2]
Kenya, Uganda, Tanzania	262		1973	TIROS
Korea (North)	Mi1523	Part of S/S of 7 + label	1976	TIROS
Korea (North)	BL29	S/S of 1	1976	TIROS
Korea (South)	858		1973	TIROS
Korea (South)	858a	S/S of 2	1973	TIROS
Liberia	653		1973	TIROS
Malagasy	C78		1964	TIROS (typeA)
Maldives	464		1974	TIROS (typeA)
Maldives	469		1974	TIROS (typeA)
Mauritania	C25		1963	TIROS (typeA)
Mexico	C323		1967	TIROS
Mongolia	363		1964	TIROS (typeA)
Morocco	120		1965	TIROS (typeA)
Niger	C41		1964	TIROS-1 (typeA)
Panama	457C		1964	TIROS-2 (typeA)
Panama	C334a, iC334a	Perf.+ imp. S/S of 2	1965	TIROS (typeA)
Panama	491	Overprint	1968	TIROS
Panama	491A	Overprint	1968	TIROS
Panama	C334a, iC334a	Perf.+ imp. S/S of 2	1965	TIROS (typeA)
Panama	491	Overprint	1968	TIROS
Panama	491A	Overprint	1968	TIROS
Panama	491b	S/S of 2, overprint	1968	TIROS
Panama	492	Overprint	1968	TIROS
Panama	492A	Overprint	1968	TIROS
Panama	492B	S/S of 2, overprint	1968	TIROS
Paraguay	816		1964	TIROS-7 (typeA)
Qatar	327		1972	TIROS (typeA)
Ras Al Khaima	BL7	Imp. S/S of 1	1966	TIROS (typeA)
Ras Al Khaima	BL19	Imp. S/S of 1, overprint new currency	1966	TIROS (typeA)
Rwanda	136	S/S of 2	1965	TIROS (typeA)
St. Pierre and Miquelon	C60		1976	TIROS (typeA)
Salvador, El	781		1968	TIROS
Salvador, El	782		1968	TIROS
Salvador, El	Kessler #1	Aerogramme	1968	TIROS
Salvador, El	Kessler #2	Aerogramme, different value	1968	TIROS
Sharjah	48a	Imp. S/S of 1	1964	TIROS-3 (typeA)
Togo	501		1964	TIROS (typeA)
Togo	503		1964	TIROS (typeA)
Togo	505a	Imp. S/S of 4	1964	TIROS (typeA)
Tonga	786a	Part of strip of 3	1991	TIROS (typeA)
Tunisia	653		1975	TIROS
Umm Al Qiwain	Mi79		1966	TIROS (typeA)
Umm Al Qiwain	Mi90	Overprint new currency	1967	TIROS (typeA)
United States	None	Part of S/S of 4[3]	1962	TIROS-1 (type-A)
Upper Volta	C28		1966	TIROS/ESSA
Yemen Arab Rep	Mi458		1966	TIROS/ESSA
Yemen Arab Rep	BL43	Imp. S/S of 1	1966	TIROS/ESSA
Yugoslavia	871		1967	TIROS
Yugoslavia	1046		1971	TIROS (typeA)

**Scott* number unless indicated with Mi or BL for *Michel*
**SS# = souvenir sheet, where # = number of stamps in sheet
***type-A designates early TIROS-1 thru 8 with camera on bottom, TIROS/ESSA have camera thru side; others cannot be determined

[1] not ESSA-8 as indicated on stamp, based on camera on bottom
[2] rocket-like nozzle centered on bottom of satellite is not typical of TIROS
[3] Interpex commemorative sheet

See also page 34 for article on NIMBUS—Landsat in this series